

Fuel Subsidy Rationalisation: The Perils of the Middle Class in Malaysia

(Rasionalisasi Subsidi Bahan Api: Kesannya ke atas Kelas Pertengahan di Malaysia)

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ABSTRACT

The middle-class is reported to experience the “middle-class squeeze”, where they are facing a declining relative income and simultaneously rising costs of living particularly with regards to housing, education and health care. Besides, the middle-class is also reported to face “the middle-class trap”, where on the one hand, they are regarded as “too rich” to qualify for any government support, but on the other hand, they found themselves in reality “not too rich” to sustain their lives without facing hardships. These observations unfortunately seem to be equally true in Malaysia, which raises the need to scrutinise the likely impact of government policy on the middle-class. With the recent fuel subsidy rationalisation in Malaysia, this paper attempts to analyse the likely welfare impact of this policy towards the middle-class in the Malaysian society. Examining this issue is crucial and desirable since the problems faced by the middle-class tend to be overlooked by the policy makers. In our analysis, we use various definitions of “middle-class” as suggested in the literature, and examine the direct, indirect and the total welfare effects of fuel subsidy removal on them using data from the Household Expenditure Survey (HES) 2004/2005 as well as the Input-Output Table for 2004/2005. Our findings reveal that, in line with the common perception, the benefits of fuel subsidy accrued mostly to the rich. Ironically, the costs of subsidy removal are borne mostly by the middle-class in terms of the direct welfare effect. Yet in terms of the indirect welfare effect, the costs of subsidy removal are borne equally by the middle-class as well as the lower and the upper class. Since the indirect welfare effect outweighs the direct welfare effect, we conclude that while the rich get most of the benefits from fuel subsidy, its removal hurts the middle-class the most. Our finding implies that fuel subsidy rationalisation must be followed by a practical strategy and program to lessen the negative impact of fuel subsidy removal not only for the poor, but also for the middle-class as well.

Keywords: Fuel subsidy; welfare effect; middle-class; Malaysia

ABSTRAK

Isu berkaitan kelas pertengahan telah dibangkitkan dalam media massa dan juga dalam penulisan akademik. Golongan kelas pertengahan ini dilaporkan mengalami “pemerahan kelas pertengahan”, iaitu mereka menghadapi pendapatan relatif yang menurun dan pada masa yang sama mereka juga menghadapi peningkatan kos sara hidup terutamanya kos perumahan, pendidikan dan kesihatan. Selain itu, kelas pertengahan juga dilaporkan menghadapi “perangkap kelas pertengahan”, iaitu dari satu segi mereka dianggap sebagai “terlalu kaya” untuk melayakkan mereka mendapat bantuan dari kerajaan, tetapi dari segi yang lain mereka pada hakikatnya mendapati diri mereka “tidak terlalu kaya” untuk mengekalkan kehidupan mereka tanpa menghadapi sebarang kesukaran. Pemerhatian ini juga dilihat berlaku di Malaysia, dan ini menimbulkan keperluan untuk meneliti kesan dasar kerajaan pada keatas kebajikan kelas pertengahan ini. Kajian ini meneliti kesan kebajikan akibat dasar rasionalisasi subsidi bahan api di Malaysia terhadap kelas pertengahan dalam masyarakat Malaysia. Penelitian keatas isu ini adalah penting dan wajar kerana masalah yang dihadapi oleh kelas pertengahan agak terabai oleh pembuat dasar. Dalam kajian ini, dengan menggunakan pelbagai definisi “kelas pertengahan” yang dicadangkan dalam kajian lepas, kesan langsung, kesan tidak langsung dan kesan keseluruhan penghapusan subsidi bahan api keatas kebajikan kelas pertengahan dianalisis dengan menggunakan data daripada Penyiasatan Perbelanjaan Isi Rumah (HES) 2004/2005 serta Jadual Input-Output 2004/2005. Hasil kajian menunjukkan bahawa, selaras dengan tanggapan umum, manfaat daripada subsidi bahan api sebahagian besarnya dinikmati oleh golongan kaya. Ironinya, kesan langsung penghapusan subsidi tersebut ditanggung sebahagian besarnya oleh kelas pertengahan. Namun, dari segi kesan tidak langsung penghapusan subsidi, ianya ditanggung secara sama rata oleh kelas pertengahan, kelas bawahan dan kelas atasan. Oleh kerana kesan kebajikan tidak langsung didapati lebih besar daripada kesan kebajikan langsung, kajian ini membuat kesimpulan bahawa walaupun golongan kaya mendapat sebahagian besar manfaat daripada subsidi bahan api, namun dari segi kesan penghapusan subsidi bahan api ianya lebih dirasai oleh kelas pertengahan. Penemuan ini menunjukkan bahawa rasionalisasi subsidi bahan api

mesti diikuti oleh satu strategi dan program yang praktikal untuk mengurangkan kesan negatifnya bukan sahaja untuk golongan miskin, tetapi juga untuk kelas pertengahan.

Kata kunci: Subsidi bahan api; kesan kebajikan; kelas pertengahan; Malaysia

INTRODUCTION

The issues with regards to the middle-class have been highlighted in the mass media as well as in the academic literature. In the western countries, such as the USA, Canada and Europe, it has been reported that not only there is a “disappearing middle-class” phenomenon (Levy and Murnane 1992; Jenkins 1995; Wolfson 1994, 1997), but the middle-class are also facing severe socio-economic problems which is termed as “the middle-class trap”. The middle-class, who are generally “neither rich nor poor”, finds it difficult to sustain their lives. While the poor qualify to receive various benefits from government’s welfare programs, the middle-class on the other hand is considered “too rich” to qualify for any support. For instance, while the poor may receive subsidies to purchase a house, the middle-class are not entitled to similar benefit. The same situation could be said with regards to education and health services. While the poor are subsidised by the government for these services, and the rich could easily afford themselves to get quality education and health services, the middle-class on the other hand find themselves struggling hard. Worse still, the continuous rise in the property prices, as well as the rising costs of education and health services further erode their abilities to purchase decent homes and to get access to good quality services. Consequently, to sustain their lives, the middle-class finds that they end up working their entire lives to serve their financial commitments. Apparently, the middle class are pressured from various forces to run faster just to stay at the same place. It is therefore not surprising to find that the middle-class are more vulnerable to severe financial distress. The growing cases of bankruptcies among this income group indicate the severity of the situation. The middle-class therefore could gradually fall into “the new poor”. Unfortunately, these observations appear to be equally true in Malaysia.

In the context of the above observations, it might be interesting to examine the likely impact of the Malaysian government policy related to subsidy rationalisation on the middle-class in Malaysia. In Malaysia, subsidy bears a long history as a policy instrument to eradicate poverty. During the New Economic Policy (NEP), subsidy or free social service of basic amenities such as housing, electricity, water, health and education have been widely used as an instrument to uplift the standard of living of the poor. Apparently, despite huge costs involved, it is undeniably true that subsidies proved to be a strong tool in helping the poor to get out of poverty. However, as Malaysia moves through various developmental stages,

the changes in political and economic landscapes at both national and international level require a dynamic transformation in policy implementation. In the New Economic Model (NEM), which is specified in the Tenth Malaysia Plan (2011-2015), the government is planning not only to rationalise fuel subsidy, but also various other subsidies and price controls (Malaysia 2010: 76-77). Basically, the aim is to remove market distortions in the economy, and thus consumption and investment decisions will be made based on true price signals. Consequently, this will help improve economic efficiency and promote economic growth and contribute towards realising the goal of the NEM to become a high income nation. In Malaysia, among the different types of subsidies, subsidy on fuel has gained much attention since its allocation constitutes a huge portion of the government annual budget and perhaps unsustainable. In 2009 for example, out of RM74 billion expenditures on total subsidies, the subsidy on fuel constituted RM23.5 billion (PEMANDU). It appears that the government is facing budget deficit and fiscal management difficulties, and the government is trying to find ways and means to overcome those problems. Since fuel subsidy allocation constitutes one of the largest portions of the government total annual budget on subsidies, reducing fuel subsidy seems appealing and practical. Besides, fuel subsidy is considered as not cost effective because it creates a substantial leakage of benefits to the non-poor. Accordingly, the government is phasing out fuel subsidy starting from 2004.

In this paper, we try to examine the likely impact of fuel subsidy removal on household welfare, particularly the middle-class. Our particular interest on the middle-class arises from the fact that this group of society is the group which is likely to face socio-economic problems, *i.e.* “the middle-class trap” and that government policies in general tend to overlook their problems. The imperative of examining this issue lies with the fact that a strong middle-class has been argued as essential for a vibrant democracy and a healthy economy.

LITERATURE REVIEW

As in the case of subsidies for other goods and services, many believe that fuel subsidies could benefit the societies as well, particularly the poor, since the lower price of fuel will increase the welfare of the society. The lower price of fuel will also stimulate growth and development, and hence contribute to the increase in income of the nation. Unfortunately, there is a gap between theory and practice, where in practice it reveals

quite a different story, painting a rather gloomy picture. Recent evidence demonstrates how fuel subsidies may turn out to be the contemporary plague of modern society as they harm the natural environment, benefit primarily those groups in society that do not need support and might lead to fiscal crisis. In addition, fuel subsidies have failed the test of equity and economic efficiency. Besides, there is also evident that, subsidies, particularly fuel subsidies, are costly when compared to other alternative policies (Granado, Coady and Gillingham, 2010)¹. This raises a question on the need for fuel subsidy reform. Fuel subsidy reform on the other hand, while desirable, raises the question on its likely effects on the welfare of society.

There are many studies investigating the likely impact of fuel subsidy reform on the welfare of society. For instance, a cross-country study by Coady et al. (2006) shows that a 50% increase in fuel prices results on average in a 4.6 per cent decrease in real incomes. Besides, it also has an impact on poverty. Sugema et al. (2005), for example, in their study on the poverty impact of fuel price adjustment in Indonesia found that an increase in petroleum price by 29% will increase poverty rate by 1.95 per cent. Besides, there are also studies that examine the distributive effects of fuel subsidy. For instance, Coady et al. (2010) discovered that over 80% of the total benefits on gasoline subsidies go to the richest 40% of households. For diesel and liquefied petroleum gas, respectively, over 65% and 70% of benefits go to these income groups. Another study by El-Said and Leigh (2006) on Gabon, reveals that the richest 10% of the individuals receive about one-third of the total subsidy. Meanwhile, the poorest 30% of individuals receive only 13% of all the subsidies. Thus, these studies suggest that the benefits of fuel subsidy are regressively distributed. The benefit of maintaining low fuel prices is captured mostly by the higher income groups, and hence, fuel subsidy becomes an inefficient instrument for protecting the poor households and ascertaining equity.

Despite numerous studies on the welfare effects of subsidy removal on society, the studies that focus on the middle-class are still lacking. This is understandable since policy debate normally give greater weight to the plight of the poor and the poorest of the society. Given the fact that the plight of the middle-class tends to be overlooked in the policy discussions, it is therefore important that the implications of fuel subsidy removal on this income group be rigorously analysed.

THE METHODOLOGY AND MODEL

THE DATA

In estimating the welfare effect of fuel subsidy removal on household welfare, we employ three sets

of data published by the Department of Statistics and the Ministry of Domestic Trade, Cooperatives and Consumerism. The first data set is the data from the Household Expenditure Survey (HES) 2004/2005 published by the Malaysian Department of Statistics.² The HES report (2004/2005) provides exhaustive data on household expenditures for a sample of slightly more than 12,000 selected households in Malaysia in 2004 and 2005. Nevertheless, these detailed expenditure data are made available to the researchers for merely one-third of them (i.e. 4,227 households). The expenditure data are divided into 12 major categories, ranging from food and non-alcoholic beverages to miscellaneous goods and services. In each category, the expenditures are broken down into a number of sub-categories which, in turn, are broken down into even smaller sub-categories. Of the 12 major categories, only the fourth and seventh categories contain data on petroleum (fuel) expenditures. In the fourth category, labelled as "Housing, Water, Electricity, Gas and Other Fuel", there are five sub-categories, of which the petroleum expenditures fall under the heading "Electricity, Gas and Fuel". In the seventh category, labelled as "Transportation", there are three sub-categories. In the second sub-category, labelled as "Managing the Private Transportation's Equipment", there are four "minor" categories, of which the petroleum expenditures fall under the heading "Fuel and Lubricants for Private Vehicles". For each household, the sum of expenditures on "Electricity, Gas and Fuel" and "Fuel and Lubricants for Private Vehicles" is taken as the individual household's fuel expenditures.³ Adding these individual fuel expenditures across 4,227 households yields the (aggregate) household's fuel expenditures.⁴ Dividing the household's fuel expenditures by the household's total expenditures yields the budget share of the aggregate petroleum product (i.e. fuel expenditures as a percentage of total expenditures). The second set of data is the Input-Output (I/O) table for 2004/2005. The I/O table contains 120 sectors, ranging from paddy to other private services. Hence, the I/O coefficient matrix associated with the I/O table is of dimension 120×120 (activity by activity).⁵

The third set of data is data with regards to fuel price and fuel subsidy. Information on the prices of various categories of fuel as well as the subsidy provided to each respective fuel category is made available by the Ministry of Domestic Trade, Consumer Affairs and Cooperatives. In the context of Malaysia, there are three major fuel or petroleum products consumed by households: RON97, RON95 and diesel. As of December 2010, RON97 was sold at RM2.30/litre while its average market price was RM2.96/litre;⁶ this means that the government provided a subsidy of 22.3%. By the same token, RON95 was sold at RM1.90/litre while its average market price was RM2.93/litre; thus, the subsidy was 35.26%. Finally, diesel was sold at RM1.80/litre while its average market price was RM2.68/litre; hence, the subsidy was 32.84%.

If the government removes the (entire) subsidy for each petroleum product, then the price is expected to increase by 28.69% for RON97, 54.13% for RON95, and 49.08% for diesel.⁷ If the percentage increase in the price of each of these petroleum products is multiplied by its quantity share⁸ and the resulting product is sum over the three petroleum products, we obtain the percentage increase in the aggregate price of petroleum products. With simple arithmetic, it can be easily shown that the aggregate price of petroleum is expected to increase by 50.14% should subsidy be removed.⁹

MEASURING THE WELFARE IMPACT OF FUEL SUBSIDY REMOVAL

In order to measure the impact of an increase in the price of fuel on the welfare of households, we follow the approach developed and employed by Coady and Newhouse (2005), and applied by Andriamihaja and Vecchi (2007). In their empirical studies on Ghana and Madagascar, respectively, the impact of a higher fuel price on the household welfare is divided into two: the direct welfare effect (DWE) and the indirect welfare effect (IWE). As the name implies, DWE refers to the adverse impact of directly consuming petroleum products (e.g. consuming gasoline for private transportation) by households when the prices of petroleum products increase, whereas IWE refers to the adverse impact of consuming other goods and services (i.e. non-petroleum products) by households when their prices increase in response to a rise in petroleum prices.

Algebraically, DWE can be expressed as follows:

$$DWE = \sum_{j=1}^J w_j^{oil} \Delta p_j^{oil} \quad (1)$$

where w_j^{oil} is the budget share of the j^{th} petroleum product, Δp_j^{oil} is the change in the price of the j^{th} petroleum product, and J is the number of petroleum products. By the same token, IWE can be expressed as follows:

$$IWE = \sum_{j=1}^S w_j^{oil} \Delta q_j \quad (2)$$

where w_j is the budget share of the j^{th} good (or service), Δq_j is the change in the consumer price of the j^{th} good (or service), and S is the number of goods and services available in the economy. Assuming that the prices of all non-petroleum goods (and services) in the economy are affected by a rise in petroleum prices, then

$$\Delta q_j = f_j(\Delta p^{oil}) \quad (3)$$

where $f_j(\Delta p^{oil})$ indicates that the change in the consumer price of j^{th} non-petroleum product is a function of the change in the aggregate producer price of petroleum products, Δp^{oil} .¹⁰ The change in the aggregate price of petroleum products, in turn, is defined as the weighted sum of the change in the prices of all petroleum products:

$$\Delta p^{oil} = \sum_{j=1}^J \delta_j \Delta p_j^{oil} \quad (4)$$

where δ_j is the quantity share of the j^{th} petroleum product. The term “quantity share of a fuel product” is not to be confused with the term “budget share of a fuel product”. While the former refers to the ratio of the quantity of a particular fuel product to the quantity of all fuel products, the latter refers to the ratio of the expenditures on fuel to the expenditures on all goods and services by households.

Substituting Eqs.(3) and (4) into Eq.(2), we obtain

$$IWE = \sum_{j=1}^S w_j f_j(\Delta p^{oil}) = \sum_{j=1}^S w_j f_j \left(\sum_{j=1}^J \delta_j \Delta p_j^{oil} \right) \quad (5)$$

Adding Eqs.(1) and (5) yields the total welfare effect (TWE) of a higher fuel price:

$$TWE = \underbrace{\sum_{j=1}^J w_j^{oil} \Delta p_j^{oil}}_{DWE} + \underbrace{\sum_{j=1}^S w_j f_j \left(\sum_{j=1}^J \delta_j \Delta p_j^{oil} \right)}_{IWE} \quad (6)$$

Of the two, measuring DWE is a relatively straightforward task. Basically, it involves three steps. First, we identify the petroleum products directly consumed by households that are subject to price increases. Second, we identify the budget share of each petroleum product consumed by households before the price increase. Third, we identify the price increases for each petroleum product. Once all of these steps have been performed, DWE can be calculated by multiplying the budget share of each petroleum product by the percentage increase in the price of each petroleum product and summing it over all petroleum products.¹¹

Unlike DWE, calculating IWE is quite a daunting task due to the difficulty involved in mapping between producer prices and consumer prices. Obviously, such mapping must take into consideration the production structures of various sectors of the economy. In order to circumvent this problem, we employ the price-shifting model developed and employed by Coady and Newhouse (2005) and followed by Andriamihaja and Vecchi (2007).¹² In this model, the production technology of the economy is assumed to be fully described by the input-output (I/O) matrix, which depicts the use of sectoral inputs in the production of sectoral outputs. In the case of Malaysia, the I/O table for 2004/2005 contains 120 sectors, ranging from paddy to other private services. Hence, the I/O coefficient matrix associated with the I/O table is of dimension 120'120 (activity by activity).

MEASURING THE “MIDDLE-CLASS”

Who are the middle-class? Are they being defined or categorised for instance in terms of their material wealth possession (e.g. income or consumption, employment), or by their held values (e.g. lifestyle of living or political views)? Which of these factors is more appropriate to

define the middle-class? It seems that it depends on who and which perspectives one is looking at – economic, sociological or political perspectives. As it is quite problematic to figure out clearly who the middle-class is in the society, naturally it is also quite difficult technically to segregate the middle-class from the rest of the society. Consequently, there is no one measure that will fully capture the concept of middle-class.

In our analysis, the economic factor, i.e. income, is treated as the main factor in defining the middle-class. Thus, we define the middle-class as those households who are categorised as the middle-income group. While defining middle-class in this manner might not be entirely satisfactory, nonetheless we consider this is sufficient for our purpose at hand. Nonetheless, the problem persists, how do we segregate the middle-class based on their income?

Fortunately, there are already various ways suggested in the literature to categorise the middle-class based on their income. First, we could divide the total household into quintiles. We then simply assume that the middle income group contains those whose income falls between the second, third and fourth quintile, i.e. upper middle-class, middle middle-class and lower middle-class. Defining middle-class in this way implies that 60% of the society is considered as the middle-class. For instance, Easterly (2001) defines the “middle class” as those lying between the 20th and 80th percentile on the income distribution. Another common measure in categorising the society based on their income is to group together the second and third quintiles and regards this group as the middle class. Thus, the households are grouped as the following: top 20%, middle 40% and bottom 40%. Meanwhile, Birdsall, Graham and Pettinato (2000) define the middle class as those between 75 and 125 percent of median per capita income. Quite similar definition is suggested by Thurow (1984), where he defines the middle-class by calculating the median income of the society and regards those households with income 25% below and above of the median income as the middle-class.¹³

Yet another way of categorising the middle-class is to define the middle-class by income threshold. For instance, the Bank Negara Malaysia defines the middle-income group as those who have income threshold between RM2000 (USD667) to RM4000 (USD1333) (Bank Negara Annual Report 2008). In this study, to ensure the robustness of the results, we employ four definitions of middle-class in our analysis. These are: (i) middle 60%; (ii) middle 40%; (iii) +/- 25% of median income; and, (iv) income threshold of RM2000 – RM4000.

THE FINDINGS

This section discusses the findings of the study. Our discussion is focused on examining the welfare impact of

removing fuel subsidy on the “middle-class” household in Malaysia. We discuss the direct and indirect, as well as the total welfare impact of fuel subsidy removal on the middle-class household in particular, as well as on the upper and lower classes. Here, we first briefly consider income and fuel expenditure pattern of the three social classes and then we discuss the welfare impact of fuel subsidy removal on them.

DESCRIPTIVE STATISTICS ANALYSIS

The total number of household in our analysis is 4225. The average household income in Malaysia is RM2954, while the average household expenditure is RM1906. The median income is RM2120, and therefore 25% above the median income is RM2650, while 25% below the median income is RM1590. Table 1 provides the number and percentage of household, income range, average income, and average expenditure of the classes by various definitions of middle-class employed in this study. It is obvious that defining the middle-class as those who are neither at the top nor bottom 20% constitute the largest number (or percentage) of household categorised as the middle-class. On the other hand, defining the middle-class as +/-25% of the median income constitute the smallest number (or percentage) of households categorised as middle-class. Indeed, only this definition of middle-class the number of household categorised as the middle class is smaller than the upper class. Thus, this definition of middle-class might not reflect the reality, where the number (or percentage) of households is generally perceived to be larger than the upper class. Perhaps, the Bank Negara Malaysia’s definition of the middle-class (income range of RM2000 – RM4000) is close to reality. Using this definition, we find that the average income and average expenditure of the middle-class is close to the average income and the average expenditure of the total sample of households.

Table 2 shows the average fuel expenditure of the various classes, as well as the ratio of average fuel expenditure of the upper and the middle classes to the lower class (poorest household), and also the ratio of fuel expenditure of the middle and lower classes to the upper class (richest household). The average monthly fuel expenditure of the total household is RM185, while the average monthly fuel expenditure of the middle-class ranges between RM128 – RM177. We also found that the average fuel expenditure of the middle-class is more or less twice that of the lower class (poorest household), and about half of the upper class (richest households) fuel expenditure.

Thus, it seems that removing fuel subsidy is justifiable as these figures show that the upper and the middle classes is most likely to benefit more from the fuel subsidy than the lower class. However, while this perception might be true, further investigation on the

TABLE 1. Number of Household, Income Range and Average Income by Various Definition of Middle-Class

Income Class	Number	Percentage	Income range (RM)	Average Income (RM)	Average Expenditure (RM)
Middle Class = 60% of the middle ((i.e. 2 nd , 3 rd and 4 th quintiles)					
Upper	845	20%	More than 3965	7338.91	3,849.80
Middle	2537	60%	1100 - 3965	2225.41	1664.84
Lower	843	20%	Less than 1100	749.23	678.70
TOTAL	4225	100.00		2953.57	1905.85
Middle Class = 40% of the middle (i.e. 2 nd and 3 rd quintiles)					
Upper	845	20%	More than 3965	7338.91	3,849.80
Middle	1691	40%	1740 - 3965	2634.06	1906.02
Lower	1689	40%	Less than 1740	1079.50	931.19
TOTAL	4225	100.00		2953.57	1905.85
Middle Class = +/- 25% of median income					
Upper	1601	37.89	More than 2650	5392.64	3060.10
Middle	1116	26.41	1590 - 2650	2084.20	1639.45
Lower	1508	35.69	Less than 1590	1009.28	877.57
TOTAL	4225	100.00		2953.57	1905.85
Middle Class = RM2000 – RM4000					
Upper	823	19.48	More than 4000	7428.38	3888.87
Middle	1421	33.63	2000 - 4000	2814.52	1993.15
Lower	1981	46.89	Less than 2000	1194.27	1019.39
TOTAL	4225	100.00		2953.57	1905.85

TABLE 2. Average Fuel Expenditure (RM/month) by Various Definition of Middle-Class

Income Class	Average fuel expenditure per month (RM)	Ratio of Average fuel expenditure to the lower class (poorest household)	Ratio of Average fuel expenditure to the upper class (richest household)
Middle Class = 60% of the middle ((i.e. 2 nd , 3 rd and 4 th quintiles)			
Upper	305.47	7.01	1.00
Middle	144.00	3.31	0.47
Lower	43.56	1.00	0.14
TOTAL	185.14	4.25	0.61
Middle Class = 40% of the middle (i.e. 2 nd and 3 rd quintiles)			
Upper	305.47	4.34	1.00
Middle	167.04	2.37	0.55
Lower	70.46	1.00	0.23
TOTAL	185.14	2.63	0.61
Middle Class = +/- 25% of median income			
Upper	267.00	4.18	1.00
Middle	127.76	2.00	0.48
Lower	63.82	1.00	0.24
TOTAL	185.14	2.90	0.69
Middle Class = RM2000 – RM4000			
Upper	308.15	3.94	1.00
Middle	177.03	2.27	0.57
Lower	78.14	1.00	0.25
TOTAL	185.14	2.37	0.60

welfare effects of fuel subsidy removal is necessary since the welfare effect of removing fuel subsidy is quite complicated, and hence, the upper class might not necessarily receive more adverse effects than the poor.

THE WELFARE EFFECTS

THE DIRECT WELFARE EFFECT (DWE)

Table 3 shows the budget share of fuel expenditure and the estimated direct welfare effect of an increase of fuel prices on the various classes. Our analysis shows that if there is a 50.14% increase in fuel price, household expenditure will have to increase by 3.75% to maintain their standard of living.¹⁴ As for the middle-class, we find that the middle-class households will have to increase their expenditure between 3.84% – 4.33% to maintain their level of comfort. Interestingly, this percentage is higher than that for the upper (3.5% – 3.76%) and the lower class (2.94% – 3.51%). Thus, it is interesting to note that, contrary to the general perception that the richest will be hurt most from fuel subsidy removal, our study reveals that the direct welfare effect is largest to the middle income group.

THE INDIRECT WELFARE EFFECT (IWE)

Table 4 shows the budget share, price effect as well as the indirect welfare effect of an increase in fuel prices by various categories of goods and services. In terms of budget share, it could be clearly seen that “Housing, Water, Electricity, Gas and Other Fuels” formed the largest share in total household expenditure (21.0%), followed by “Food and Non-Alcoholic Beverages” (20.7%), “Transport” (15.9%) and “Restaurants and Hotels” (11.3%). In terms of the price effects of an increase in fuel prices, our analysis shows that the highest impact is on “Transport” (1.4%), followed by “Housing, Water, Electricity, Gas and Other Fuels” (1.1%), “Recreation Services and Culture” (1.0%), and “Food and Non-Alcoholic Beverages” (1.0%).

As far as the indirect welfare impact of fuel price increase is concerned, we discover that a 50.14% increase in fuel price will reduce household real income (purchasing power) by 7.0%. We also find that there are three sectors that contributed the most to the total reduction in purchasing power. These are “Housing, Water, Electricity, Gas and Other Fuels” (27.7%), “Transport” (26.5%), and “Food and Non-Alcoholic Beverages” (23.5%). Thus, these three

TABLE 3. Fuel Budget Shares and Direct Welfare Effect of the Middle-Class

Income Class	Average Expenditure (RM)	Budget share (% of fuel expenditure)	Direct Welfare Effect resulting from price change (%)
Middle Class = 60% of the middle (i.e. 2 nd , 3 rd and 4 th quintiles)			
Upper	3853.70	6.99	3.50
Middle	1664.84	8.19	4.11
Lower	678.70	5.87	2.94
TOTAL	1905.85	7.47	3.75
Middle Class = 40% of the middle (i.e. 2 nd and 3 rd quintiles)			
Upper	3853.70	6.99	3.50
Middle	1906.02	8.40	4.21
Lower	931.19	6.90	3.46
TOTAL	1905.85	7.47	3.75
Middle Class = +/- 25% of median income			
Upper	3060.10	7.49	3.76
Middle	1639.45	7.66	3.84
Lower	877.57	6.83	3.42
TOTAL	1905.85	7.47	3.75
Middle Class = RM2000 – RM4000			
Upper	3888.87	7.01	3.51
Middle	1993.15	8.63	4.33
Lower	1019.39	7.00	3.51
TOTAL	1905.85	7.47	3.75

Note: As 31st December 2010, the removal of fuel subsidies on RON95, RON97 & DIESEL will result in the average change in fuel prices in Malaysia by 50.14%)

TABLE 4. Indirect Welfare Effects of Removing Fuel Subsidies in Malaysia

Sector	Budget Shares (%)	Price Effects (%)	Impact on Expenditure (%)	Per cent of Total Impact (%)
	1	2	(1 x 2)/100	
01-Food and Non-Alcoholic Beverages	20.66	7.92	1.64	23.48
02-Alcoholic Beverages and Tobacco	1.92	0.89	0.02	0.24
03-Clothing and Footwear	3.44	3.14	0.11	1.55
04-Housing, Water, Electricity, Gas and Other Fuels	20.96	9.22	1.93	27.73
05-Furnishing, Household Equipment and Routine Household Maintenance	4.59	3.31	0.15	2.18
06-Health	1.41	1.37	0.02	0.28
07-Transport	15.90	11.63	1.85	26.53
08-Communication	5.15	0.46	0.02	0.34
09-Recreation Services and Culture	4.45	8.01	0.36	5.12
10-Education	1.86	1.25	0.02	0.33
11-Restaurants and Hotels	11.33	3.28	0.37	5.33
12-Miscellaneous Goods and Services	8.33	5.76	0.48	6.89
TOTAL	100.0	–	6.97	100.00

Note: As 31st December 2010, the removal of fuel subsidies on RON95, RON97 & DIESEL will result in the average change in fuel prices in Malaysia by 50.14%

sectors contributed more than three-quarter (77.7%) of the total reduction in household real income. This is not surprising at all since the magnitude of the indirect welfare effect basically depends on the size of the budget share as well as the magnitude of the price effects of the respective sectors. Apparently, these three sectors not only make up a relatively large share in total household expenditure, but these three sectors also suffer a relatively large price effects compared to the other sectors.

We further investigate the indirect welfare effect by various classes, which are shown in Table 5 – Table 8. It could be clearly seen from Table 5 – Table 6 that while there are differences in the size or magnitude, the budget share of these three sectors - “Housing, Water, Electricity, Gas and Other Fuels”; “Food and Non-Alcoholic Beverages”; and “Transport” - constitute a substantial share in the total household expenditure of each income group. Nonetheless, there are noticeable differences in the budget share pattern of the upper class compared to the middle and lower classes. We discover that the highest budget share of the upper class goes to “Housing, Water, Electricity, Gas and Other Fuels”, followed by “Transport”, and “Food and Non-Alcoholic Beverages”. On the other hand, “Food and Non-Alcoholic Beverages” constituted the highest budget

share for the lower and the middle classes, followed by “Housing, Water, Electricity, Gas and Other Fuels”, and then “Transport”. Besides, it is also interesting to note that the budget share of the lower and the middle classes is quite significantly higher than the upper class not only in “Food and Non-Alcoholic Beverages”, but also in “Housing, Water, Electricity, Gas and Other Fuels”. The upper class on the other hand has a significantly higher budget share in Transport compared to the lower and the middle classes.

Interestingly, the indirect welfare effects of fuel subsidy removal on the various classes are small and about even. We discover that a 50.14% increase in fuel price will generally reduce household real income (purchasing power) of each of the respective classes by about 7.0%. Nonetheless, the sectors that contributed to this reduction in purchasing power are different for different classes due to differences in the budget share pattern for each income group. This is quite easy to understand since the indirect welfare effect of the increase in fuel price will only depend on the size of the budget share of the respective class in the various sectors of goods and services. The price effects of an increase in fuel prices, on the other hand, are similar for all of the income groups.

TABLE 5. Indirect Welfare Effects of Removing Fuel Subsidies by Sector and Income Group in Malaysia (*Middle Class = 60% of the middle (i.e. 2nd, 3rd and 4th quintiles)*)

	01-Food and Non-Alcoholic Beverages	02-Alcoholic Beverages and Tobacco	03-Clothing and Footwear	04-Housing, Water, Electricity, Gas and Other Fuels	05-Furnishing, Household Equipment and Routine Household Maintenance	06-Health	07-Transport	08-Communication	09-Recreation Services and Culture	10-Education	11-Restaurants and Hotels	12-Miscellaneous Goods and Services	TOTAL
	UPPER (Top 20% - Richest)												
Budget Shares (%) (1)	15.10	1.59	3.09	19.87	5.41	1.62	18.53	5.88	5.58	2.37	11.07	9.90	100.0
Price Effects (%) (2)	7.919	0.889	3.135	9.221	3.312	1.367	11.63	0.459	8.013	1.249	3.279	5.761	-
Impact on Expenditure (%) (1)x(2)/100	1.196	0.014	0.097	1.833	0.179	0.022	2.155	0.027	0.447	0.030	0.363	0.570	6.933
Percent of Total Impact (%)	17.25	0.20	1.40	26.43	2.58	0.32	31.08	0.39	6.45	0.43	5.23	8.23	100.00
	MIDDLE (Middle 60%)												
Budget Shares (%) (1)	23.33	2.10	3.68	21.11	4.12	1.30	14.96	4.87	3.88	1.57	11.57	7.51	100.0
Price Effects (%) (2)	7.919	0.889	3.135	9.221	3.312	1.367	11.63	0.459	8.013	1.249	3.279	5.761	-
Impact on Expenditure (%) (1)x(2)/100	1.848	0.019	0.115	1.947	0.136	0.018	1.740	0.022	0.311	0.020	0.379	0.433	6.988
Percent of Total Impact (%)	26.44	0.27	1.65	27.86	1.95	0.25	24.90	0.32	4.45	0.28	5.43	6.19	100.00
	LOWER (Bottom 20% - Poorest)												
Budget Shares (%) (1)	32.56	2.46	3.68	25.98	3.39	1.08	7.88	3.06	2.26	1.14	11.05	5.45	100.0
Price Effects (%) (2)	7.919	0.889	3.135	9.221	3.312	1.367	11.63	0.459	8.013	1.249	3.279	5.761	-
Impact on Expenditure (%) (1)x(2)/100	2.579	0.022	0.115	2.396	0.112	0.015	0.917	0.014	0.181	0.014	0.362	0.314	7.041
Percent of Total Impact (%)	36.62	0.31	1.64	34.03	1.60	0.21	13.02	0.20	2.57	0.20	5.14	4.46	100.01

Note: As 31st December 2010, the removal of fuel subsidies on RON95, RON97 & DIESEL will result in the average change in fuel prices in Malaysia by 50.14%

TABLE 6. Indirect Welfare Effects of Removing Fuel Subsidies by Sector and Income Group in Malaysia (*Middle Class = 40% Of The Middle (I.E. 2nd And 3rd Quintiles)*)

	01-Food and Non-Alcoholic Beverages	02-Alcoholic Beverages and Tobacco	03-Clothing and Footwear	04-Housing, Water, Electricity, Gas and Other Fuels	05-Furnishing, Household Equipment and Routine Household Maintenance	06-Health	07-Transport	08-Communication	09-Recreation Services and Culture	10-Education	11-Restaurants and Hotels	12-Miscellaneous Goods and Services	TOTAL
	UPPER (Top 20% - Richest)												
Budget Shares (%) (1)	15.10	1.59	3.09	19.87	5.41	1.62	18.53	5.88	5.58	2.37	11.07	9.90	100.0
Price Effects (%) (2)	7.919	0.889	3.135	9.221	3.312	1.367	11.63	0.459	8.013	1.249	3.279	5.761	-
Impact on Expenditure (%) (1)x(2)/100	1.196	0.014	0.097	1.833	0.179	0.022	2.155	0.027	0.447	0.030	0.363	0.570	6.933
Percent of Total Impact (%)	17.25	0.20	1.40	26.43	2.58	0.32	31.08	0.39	6.45	0.43	5.23	8.23	100.00
	MIDDLE (Middle 40%)												
Budget Shares (%) (1)	21.95	2.03	3.62	20.75	4.24	1.36	15.83	5.09	4.17	1.70	11.67	7.59	100.0
Price Effects (%) (2)	7.919	0.889	3.135	9.221	3.312	1.367	11.63	0.459	8.013	1.249	3.279	5.761	-
Impact on Expenditure (%) (1)x(2)/100	1.738	0.018	0.114	1.914	0.140	0.019	1.841	0.023	0.334	0.021	0.383	0.437	6.982
Percent of Total Impact (%)	24.90	0.26	1.63	27.41	2.01	0.27	26.37	0.33	4.79	0.30	5.48	6.27	100.00
	LOWER (Bottom 40% - Poorest)												
Budget Shares (%) (1)	29.52	2.37	3.80	23.63	3.60	1.10	10.61	3.77	2.69	1.14	11.18	6.60	100.0
Price Effects (%) (2)	7.919	0.889	3.135	9.221	3.312	1.367	11.63	0.459	8.013	1.249	3.279	5.761	-
Impact on Expenditure (%) (1)x(2)/100	2.338	0.021	0.119	2.179	0.119	0.015	1.234	0.017	0.215	0.014	0.367	0.380	7.018
Percent of Total Impact (%)	33.31	0.30	1.70	31.04	1.70	0.21	17.58	0.25	3.07	0.20	5.22	5.42	100.00

Note: As 31st December 2010, the removal of fuel subsidies on RON95, RON97 & DIESEL will result in the average change in fuel prices in Malaysia by 50.14%

TABLE 7. Indirect Welfare Effects of Removing Fuel Subsidies by Sector and Income Group in Malaysia (Middle Class = +/- 25% Of Median Income)

	01-Food and Non-Alcoholic Beverages	02-Alcoholic Beverages and Tobacco	03-Clothing and Footwear	04-Housing, Water, Electricity, Gas and Other Fuels	05-Furnishing, Household Equipment and Routine Household Maintenance	06-Health	07-Transport	08-Communication	09-Recreation Services and Culture	10-Education	11-Restaurants and Hotels	12-Miscellaneous Goods and Services	TOTAL
	UPPER												
Budget Shares (%) (1)	16.93	1.64	3.23	20.21	5.10	1.57	17.59	5.68	5.16	2.21	11.42	9.26	100.0
Price Effects (%) (2)	7.919	0.889	3.135	9.221	3.312	1.367	11.63	0.459	8.013	1.249	3.279	5.761	-
Impact on Expenditure (%) (1)x(2)/100	1.341	0.015	0.101	1.864	0.169	0.021	2.045	0.026	0.413	0.028	0.374	0.533	6.931
Percent of Total Impact (%)	16.93	1.64	3.23	20.21	5.10	1.57	17.59	5.68	5.16	2.21	11.42	9.26	100.00
	MIDDLE (Middle Class = +/- 25% of median income)												
Budget Shares (%) (1)	23.70	2.28	3.73	20.74	3.93	1.24	15.75	4.77	3.87	1.45	11.14	7.42	100.0
Price Effects (%) (2)	7.919	0.889	3.135	9.221	3.312	1.367	11.63	0.459	8.013	1.249	3.279	5.761	-
Impact on Expenditure (%) (1)x(2)/100	1.877	0.020	0.117	1.912	0.130	0.017	1.831	0.022	0.310	0.018	0.365	0.427	7.047
Percent of Total Impact (%)	23.70	2.28	3.73	20.74	3.93	1.24	15.75	4.77	3.87	1.45	11.14	7.42	100.00
	LOWER												
Budget Shares (%) (1)	30.26	2.43	3.82	24.04	3.60	1.05	9.87	3.70	2.66	1.13	11.25	6.18	100.0
Price Effects (%) (2)	7.919	0.889	3.135	9.221	3.312	1.367	11.63	0.459	8.013	1.249	3.279	5.761	-
Impact on Expenditure (%) (1)x(2)/100	2.396	0.022	0.120	2.217	0.119	0.014	1.148	0.017	0.213	0.014	0.369	0.356	7.005
Percent of Total Impact (%)	30.26	2.43	3.82	24.04	3.60	1.05	9.87	3.70	2.66	1.13	11.25	6.18	100.00

Note: As 31st December 2010, the removal of fuel subsidies on RON95, RON97 & DIESEL will result in the average change in fuel prices in Malaysia by 50.14%

TABLE 8. Indirect Welfare Effects of Removing Fuel Subsidies by Sector and Income Group in Malaysia (Middle Class = RM2000 – RM4000)

	01-Food and Non-Alcoholic Beverages	02-Alcoholic Beverages and Tobacco	03-Clothing and Footwear	04-Housing, Water, Electricity, Gas and Other Fuels	05-Furnishing, Household Equipment and Routine Household Maintenance	06-Health	07-Transport	08-Communication	09-Recreation Services and Culture	10-Education	11-Restaurants and Hotels	12-Miscellaneous Goods and Services	TOTAL
	UPPER												
Budget Shares (%) (1)	15.07	1.56	3.08	19.92	5.40	1.61	18.63	5.85	5.56	2.36	11.08	9.88	100.0
Price Effects (%) (2)	7.919	0.889	3.135	9.221	3.312	1.367	11.63	0.459	8.013	1.249	3.279	5.761	-
Impact on Expenditure (%) (1)x(2)/100	1.193	0.014	0.096	1.837	0.179	0.022	2.166	0.027	0.446	0.029	0.363	0.569	6.942
Percent of Total Impact (%)	15.07	1.56	3.08	19.92	5.40	1.61	18.63	5.85	5.56	2.36	11.08	9.88	100.00
	MIDDLE (Middle Class = RM2000 – RM4000)												
Budget Shares (%) (1)	21.56	2.01	3.61	20.71	4.33	1.41	15.56	5.22	4.35	1.79	11.70	7.76	100.0
Price Effects (%) (2)	7.919	0.889	3.135	9.221	3.312	1.367	11.63	0.459	8.013	1.249	3.279	5.761	-
Impact on Expenditure (%) (1)x(2)/100	1.707	0.018	0.113	1.910	0.143	0.019	1.809	0.024	0.348	0.022	0.384	0.447	6.945
Percent of Total Impact (%)	21.56	2.01	3.61	20.71	4.33	1.41	15.56	5.22	4.35	1.79	11.70	7.76	100.00
	LOWER												
Budget Shares (%) (1)	28.27	2.35	3.79	22.95	3.67	1.10	12.06	3.93	2.84	1.16	11.21	6.67	100.0
Price Effects (%) (2)	7.919	0.889	3.135	9.221	3.312	1.367	11.63	0.459	8.013	1.249	3.279	5.761	-
Impact on Expenditure (%) (1)x(2)/100	2.239	0.021	0.119	2.116	0.121	0.015	1.403	0.018	0.228	0.015	0.367	0.385	7.046
Percent of Total Impact (%)	28.27	2.35	3.79	22.95	3.67	1.10	12.06	3.93	2.84	1.16	11.21	6.67	100.00

Note: As 31st December 2010, the removal of fuel subsidies on RON95, RON97 & DIESEL will result in the average change in fuel prices in Malaysia by 50.14%

THE TOTAL WELFARE EFFECT (TWE)

The total welfare effect of an increase in fuel price could be obtained by summing up its direct and indirect effects. Table 9 shows the total welfare effect of fuel price increase, which figures are apparently derived from Table 5 – Table 8. Overall, our study reveals that a 50.14% increase in fuel prices will reduce household real income (purchasing power) by 10.7%. This means

that, for every RM100 of total household expenditure, there is a loss of purchasing power equal to RM10.70. We also discover that a large percentage (65.0%) of the total welfare loss is attributed to the indirect effect of the fuel price increase. In this regards, our findings appear to be in agreement with the findings of the previous studies in which the indirect welfare effect tends to dominate. Besides, while the indirect welfare effect contributed more to total welfare loss, the percentage contribution

TABLE 9. Total Welfare Effect of Fuel Price Increase (% of Total Household Expenditure) in Malaysia

Welfare Effect	UPPER	MIDDLE	LOWER	ALL Household
Middle Class = 60% of the middle (i.e. 2 nd , 3 rd and 4 th quintiles)				
Direct Welfare Effect	3.505	4.106	2.943	3.745
Indirect Welfare Effect	6.933	6.988	7.041	6.969
Total Welfare Effect	10.44	11.09	9.98	10.71
DWE as % of Total	33.58	37.01	29.48	34.96
IWE as % of Total	66.42	62.99	70.52	65.04
Share of the Burden				
Direct Welfare Effect	37.50	56.97	5.53	100.00
Indirect Welfare Effect	40.23	52.59	7.18	100.00
Total Welfare Effect	39.27	54.13	6.60	100.00
Middle Class = 40% of the middle (i.e. 2 nd and 3 rd quintiles)				
Direct Welfare Effect	3.505	4.214	3.46	3.745
Indirect Welfare Effect	6.933	6.982	7.018	6.969
Total Welfare Effect	10.44	11.20	10.48	10.71
DWE as % of Total	33.58	37.64	33.02	34.95
IWE as % of Total	66.42	62.36	66.98	65.05
Share of the Burden				
Direct Welfare Effect	37.50	44.64	17.87	100.00
Indirect Welfare Effect	40.23	40.11	19.66	100.00
Total Welfare Effect	39.27	41.71	19.03	100.00
Middle Class = +/- 25% of median income				
Direct Welfare Effect	3.757	3.839	3.423	3.743
Indirect Welfare Effect	6.931	7.047	7.005	6.969
Total Welfare Effect	10.69	10.89	10.43	10.71
DWE as % of Total	35.15	35.26	32.82	34.94
IWE as % of Total	64.85	64.74	67.18	65.06
Share of the Burden				
Direct Welfare Effect	61.44	23.44	15.12	100.00
Indirect Welfare Effect	60.51	22.97	16.52	100.00
Total Welfare Effect	60.83	23.14	16.03	100.00
Middle Class = RM2000 – RM4000				
Direct Welfare Effect	3.513	4.329	3.512	3.743
Indirect Welfare Effect	6.942	6.945	7.046	6.969
Total Welfare Effect	10.45	11.27	10.56	10.71
DWE as % of Total	33.60	38.40	33.26	34.94
IWE as % of Total	66.40	61.60	66.74	65.06
Share of the Burden				
Direct Welfare Effect	36.75	40.07	23.18	100.00
Indirect Welfare Effect	39.59	35.05	25.36	100.00
Total Welfare Effect	38.59	36.82	24.59	100.00

Note: As 31st December 2010, the removal of fuel subsidies on RON95, RON97 & DIESEL will result in the average change in fuel prices in Malaysia by 50.14%

of the indirect welfare effect is noticeably quite higher for the lower class compared to the rest of the income classes. This implies that the rise in the general price of goods and services (due to fuel price increase) affects the lower class more than the upper and middle classes.

We also discover another interesting observation, which is worthy to be highlighted. Our analysis reveals that a 50.14% increase in fuel prices will reduce middle-class household real income (purchasing power) by 10.9% – 11.3%, which is noticeably higher than the upper and lower classes, regardless of the definition of the middle-class used. Our findings also show that in terms of the burden of the total welfare effects, the share of the middle-class is higher than the upper and lower classes when middle-class is defined as middle 60% and middle 40%. Thus, our findings generally imply that the middle-class is hurt most from the fuel subsidy removal. Perhaps, this is due to the fact that their fuel budget share is larger than that of the upper or the lower classes.

SUMMARY AND CONCLUSIONS

The intention of the government to carry out fuel subsidy reform in Malaysia entails an investigation on the impact of subsidy removal on household welfare, particularly on the middle-class. While the rationale for reducing subsidy is (i.e. to ease the financial burden of the government) is commonly understood, its consequences on the welfare of the middle-class however remain to be discovered. This study is motivated by the desire to explore the likely effect of subsidy removal on the welfare of the middle-class since the question with regards to the plight of the middle-class has been highlighted in the mass media as well as in the academic literature such as the “middle-class squeeze”, or “the middle-class trap”. We believe that examining the likely impact of fuel subsidy removal would shed some light on the debate about the middle-class.

Based on the empirical evidences discovered in our study, it can be concluded that our findings lend support to the commonly held view that the upper class (richest section of the society) benefitted the most from fuel subsidy. Therefore, removing fuel subsidy appears justifiable. However, while fuel subsidy reform appears to be justified, nonetheless it must be managed properly. As our study reveals, removing fuel subsidy not only hurt the poor, but quite surprisingly, it also indicated that it is the middle-class that will be hit the most. Thus, our finding calls for a careful implementation of the fuel subsidy reform to mitigate its impact on these groups. The reform must be followed by a practical strategy and program to lessen the impact on the lower as well as on the middle income group. Perhaps, several mitigating measures are needed to help compensate them. Some of the practical policy implementations include among others: wider provision of affordable houses especially in

the city, ensuring a stable food price through promotion and incentives targeting at increasing local supplies. The study has also shown that households are spending a large proportion of their income on hire purchase. Reduction in import tariff will certainly be translated into lower price of cars and will help them to allocate some of the saving to lessen their burden. It is therefore suggested that a major adjustment in import tariff for cars is carried out as to ensure that people could afford to buy cars at a reasonable price.

ENDNOTES

- 1 The study by Granado, Coady and Gillingham (2010) on developing countries shows that the cost of transferring one dollar to the 20% poorest households via gasoline subsidy is around 33 dollars (i.e., \$1/0.03). They further argued that, if 15 out of every 100 dollars to be allocated to a safety net program is absorbed by administrative costs and 80% of the remaining 85 dollars in beneficiary transfers reaches the poor (or 68% of the total budget), then the cost-benefit ratio for such a program is 1.5 dollars (i.e., \$1/0.68). This shows that the opportunity cost of subsidising fuel is high and costly. This justifies the subsidy reform embarked upon by many countries including Malaysia.
- 2 The last HES data is HES 2009/2010, but has not yet been published at the time this research was conducted. HES data are generally considered to be high quality data, and are extensively used in various researches.
- 3 By the same token, the individual household's total expenditures are defined as the sum of expenditures on all goods and services for each household.
- 4 Similarly, adding the individual household's total expenditures across 4,227 households yields the (aggregate) household's total expenditures.
- 5 The last estimated I/O table is in 2009/2010, but has not yet been published at the time this research was conducted)
- 6 The term “average market price” is used because the actual market price differs across three broad geographical areas in Malaysia: Peninsular Malaysia, Sarawak and Sabah.
- 7 All of the stated fuel prices are taken from (provided by) the Ministry of Domestic Trade, Cooperative and Consumerism.
- 8 Of the three, RON95 captures 56.3% of the quantity share, diesel 35%, and RON97 8.7% (calculated from figures provided by the Ministry of Domestic Trade, Cooperative and Consumerism).
- 9
$$\Delta p^{oil} = \sum_{j=1}^3 \delta_j \Delta p_j^{oil} = \delta_{RON97} \Delta p_{RON97} + \delta_{RON95} \Delta p_{RON95} + \delta_{Diesel} \Delta p_{Diesel} = (0.563 \times 28.69) + (0.35 \times 54.13) + (0.087 \times 49.08) = 50.14\%.$$
- 10 Note that q is used to denote the consumer price of a good while p the producer price of a good.
- 11 In this study, our calculation using a simple arithmetic shows that the removal of fuel subsidy will increase the aggregate price of petroleum by 50.14%. For the DWE, we imposed a strong assumption that households do not substitute away from fuel when there is a change in price. This can be interpreted as short run impact where households are not flexible enough to adjust their consumption on fuel.

- 12 As for the IWE, we implicitly assumed zero demand price elasticity which is also considered as a short term impact.
- 13 The various measures of the middle class suggested in the literature have been discussed by Ravallion (2010).
- 14 This estimation should be cautiously interpreted since we are using data from the HES 2004/2005 data. It should be mentioned here that in 2004/2005, most household appear to use RON97 since the government did not remove the subsidy on fuel yet. Hence, it is not surprising to find that RON97 formed the largest share of fuel expenditure in 2004/2005. Fuel subsidy is reduced, particularly on RON97, starting in 2009.

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